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L9: Entry 1 of 1 File: USPT Mar 2, 1999

~102 clms 15-
102 clm 1-14?

DOCUMENT-IDENTIFIER: US 5876990 A
TITLE: Biochemical media system for reducing pollution

Brief Summary Text (64):
For every 100 pounds of liquid culture, the ingredients listed in Table 3 are mixed in a mixer until a doughy mass is obtained. After the mass reaches the specified consistency, the mass is extruded to form wet pellets. The wet pellets are dried under sanitary conditions using a drier at ambient temperature. The culture also can be pelletized or shaped to any size or dimension, depending on the application. Optionally, enzymes can be included in the body of the pellets or sprayed on to the pellets after they are extruded. For example: protease enzyme can be included in the body of the micro-prep, and catalase enzyme can be sprayed on to the surface of the pellet.

Brief Summary Text (65):
Catalase positive organisms, catalase negative organisms, mixed compost and soil organisms can be separately extruded, pelletized, and dried. Thereafter, the different pellets can be mixed in any desired proportion. For uses such as adding to a stream of water, a liquid medium may be preferred. In that case, the liquid culture micro-prep can be used directly, without pelletizing, in the form of single catalase positive or catalase negative cultures or in combination of both catalase positive and catalase negative cultures. The amount and type of liquid culture can be varied according to the desired use and application. Optionally, liquid cultures can be impregnated with enzymes, as listed in Table 4.

Brief Summary Text (66):
In another use, the liquid culture can be sprayed onto feeds as a nutritional supplement. Typical feeds include extruded, sinkable shrimp feed pellets, extruded or pelletized, floating trout or other fish feed, and dairy, poultry, piggery or other animal feed. When the micro-prep is used as a feed supplement, it can be fortified by nutrients such as vitamins, minerals, amino acids, fatty acids, non-specific stimulatory compounds, proteins, lipids and phospholipids. Thus, the micro-prep serves dual functions as a probiotic bacterial culture and also as a beneficial supplement.

Brief Summary Text (70):
These ingredients are combined and mixed together until they form a fairly uniform doughy mass. This mass is extruded into pellets or molded into different shapes (squares, round balls, etc.). The extruded or molded mass is dried in a drier at an ambient temperature. The dried oxy-prep can be stored at room temperature for an extended period, such as one or more years without losing the activity.

Brief Summary Text (71):
The composition of oxy-prep is modifiable by variations and substitutions in the listed ingredients. Among the possible substitutions, hydrogen peroxide can be replaced with a different substance capable of liberating oxygen upon contact with water. Proteinaceous compounds such as yeast proteins, whey protein concentrates, caseinates, vegetable proteins, nonfat dry milk, or the like, may replace urea. Such proteinaceous compounds appear to stabilize the oxygen liberating compound during drying and subsequent storage. Silica can be replaced with bentonite, such as sodium

or calcium bentonite and especially the clumping types of bentonite, although storage stability is notably reduced. For purposes of stabilizing the oxy-prep for long term storage, washed, metal free silica is preferred. Enzymes are an optional addition to the oxy-prep composition, which can be included as long as they are of the type that do not have peroxide destabilizing properties. Catalase enzyme will liberate oxygen by reacting with oxygen yielding peroxides. However, catalase can be used without harming the oxy-prep, provided that it is dried before it is applied to the dried oxy-prep. Further, dried, finely powdered micro-prep can be adsorbed onto oxy-prep. Rice flour can be replaced by any other vegetable flour, such as corn, potato, or the like, provided the replacements are free of enzymes that destabilize oxygen bearing compounds such as hydrogen peroxide.

Brief Summary Text (74):
Shapes, sizes, weights and meshes of micro-prep and oxy-prep are adjusted according to the purpose. The oxy-prep and micro-prep can be extruded in any shape, size and weight. For use in ponds to reduce pollution, foul odors, COD (chemical oxygen demand), BOD (biochemical oxygen demand), suspended solids and hydrocarbons, the preparations can be applied directly or included in shrimp feed. For the latter purpose, they are extruded into the same shape and size as the feed or made bigger to prevent their being eaten right away. For use in fish feed, they are extruded to be either larger or much smaller than the feed, so that fish do not eat them before they generate oxygen. If desired, they can be lowered to the bottom of ponds in bags, cages, or other protective housing means that prevent their being eaten by aquatic animals. For use in animal feeds, they are pulverized. For use in fertilizer applications, they are molded, pulverized or extruded, according to the application. For use as an additive to raw milk, the food grade oxy-prep and micro-prep are prepared either as powders or liquids. The liquids may be used in frozen state.

Brief Summary Paragraph Table (1):
TABLE 1 ______________________________________ GROWTH MEDIUM COMPOSITION FOR CATALASE POSITIVE ORGANISMS TYPICAL PREFERRED INGREDIENT PERCENTAGE RANGE RANGE ______________________________________ Dextrose 4.0 2.5 to 10 3 to 7 Yeast Extract 2.0 0.5 to 5.0 1.5 to 4 Bentonite 2.0 1 to 5.0 1.5 to 3.0 Rice Flour 2.0 1.5 to 5.0 2 to 4 Calcium Carbonate 1.75 0.25 to 4.0 0.5 to 2.5 Guar Gum 0.25 0.1 to 0.50 0.2 to 0.3 Water 88.0 70.5 to 94.15 79.2 to 91.3 ______________________________________

Brief Summary Paragraph Table (3):
TABLE 3 ______________________________________ COMPOSITION OF MICRO-PREP TYPICAL PREFERRED INGREDIENT PERCENTAGE.sup.(a) RANGE RANGE ______________________________________ Lecithin 1.50 0.25 to 5.00 1.00 to 3.00 Sodium Propionate 0.15 0.05 to 0.30 0.10 to 0.20 Potassium Sorbate 0.10 0.05 to 0.30 0.05 to 0.15 Guar Gum 1.00 0.25 to 2.00 0.50 to 1.50 Calcium Carbonate 2.25 0.50 to 5.00 1.00 to 3.00 Clumping Bentonite 23.00 7.50 to 40.00 10.00 to 30.00 Vegetable Flour 65.00 30.00 to 80.00 40.00 to 70.00 Catalase Enzyme 1.00 0.10 to 10.00 0.50 to 2.50 Protease Enzyme 1.00 0.10 to 10.00 0.50 to 2.50 Cellulase enzyme 1.00 0.10 to 10.00 0.50 to 2.50 Amylase Enzyme 1.00 0.10 to 10.00 0.50 to 2.50 Pectinase Enzyme 0.10 0.05 to 5.00 0.075 to 1.00 Lipase Enzyme 0.50 0.05 to 5.00 0.10 to 1.50 Sodium Bicarbonate 2.00 0.25 to 5.00 0.20 to 3.00 Glucose Oxidase 0.25 0.05 to 5.00 0.10 to 1.50 Lactase 0.15 0.05 to 5.00 0.10 to 1.50 ______________________________________

Brief Summary Paragraph Table (4):
TABLE 4 ______________________________________ COMPOSITION OF OXY-PREP TYPICAL PREFERRED INGREDIENT PERCENTAGE RANGE RANGE ______________________________________ Hydrogen Peroxide 15.00 2.5 to 40 15 to 30 (35%-75% strength) Urea 15.00 5 to 40 10 to 50 Lecithin 1.25 0.1 to 5.0 1.0 to 3.0 Guar Gum 0.75 0.5 to 4.0 0.60 to 2.5 Silica 23.00 10 to 60 20 to 40 Rice Flour 45.00 20 to 80 40 to 60 ______________________________________

Detailed Description Text (19):
Enzymes such as protease, lipase, cellulase, amylase, pectinase, lactase, glucose oxidase, and galactose oxidase were applied in micro-prep for reducing suspended solids and pollution. Micro-prep was prepared with the addition of the above mentioned enzymes, according to the procedure for Preparation of Micro-Prep, above. Dried oxy-prep and micro-prep were added to shrimp pond water at the rate of 0.25% and incubated at room temperature for a period of one week. Oxygen levels were

checked before and after addition of the preparations. Suspended solids were measured at 0 time, after 2 days, and after 7 days. The level of suspended solids corresponds to the level of pollution. The results are presented in Table 7.

Detailed Description Text (45):
Micro-prep was prepared following the procedure described in Preparation of Micro-Prep, above. The following food grade cultures were included in the micro-prep: Lactococcus lactis var. lactis, Lactococcus lactis var cremoris, Lactococcus lactis var lactis subspecies diacetylactis, Lactobacillus lactis, Lactobacillus bulgaricus, Lactobacillus acidophilus, Lactobacillus helveticus and Streptococcus thermophilous. The cultures were blended, and for every 100 pounds of liquid culture, the following sterile ingredients were added and extruded into pellets: lecithin 1.5 pounds, sodium propionate 0.2 pounds, calcium carbonate 2.25 pounds, guar gum 1 pound, nonfat dry milk 23 pounds, lactoperoxidase enzyme 0.1 pounds, glucose oxidase enzyme 10.0 pounds, lactase enzyme 0.1 pound, fine mesh sodium caseinate and/or vegetable flour 50 pounds. The extruded culture was dried at ambient temperature under sterile conditions. The dried culture was milled and mixed with same mesh sodium bicarbonate and glucose at a ratio of 50:50. In this preparation, catalase does not have to be added because raw milk contains trace amounts of this enzyme.

Detailed Description Text (46):
The oxy-prep was prepared by mixing 20 pounds of food grade hydrogen peroxide with 20 pounds of nonfat dry milk, 20 pounds of glucose, 10 pounds of dried casein and 1.5 pounds of liquid lecithin. In some samples, food grade urea and vegetable flour were used in the place of casein or nonfat dry milk, to tie up the hydrogen peroxide. Food grade urea functioned as effectively as high protein casein or nonfat dry milk. After the ingredients were mixed, they were extruded into pellets and dried at ambient temperature. The pellets were milled and mixed with same mesh sodium bicarbonate in a 50:50 ratio.

Detailed Description Text (50):
Similar results are obtained when hydrogen peroxide is replaced by other oxygen yielding compounds, or urea is replaced by other high protein compounds such as whole cell yeast, isolated yeast protein, vegetable protein, or milk derived proteins such as nonfat dry milk, whey protein concentrate, casein or casein hydrolyzate, provided they are free from traces of catalase or peroxide cleaving enzymes.

Detailed Description Text (56):
A dried oxy-micro-preparation was prepared by using the following procedure: the culture was prepared as described for frozen preparation. After the cultures were fully grown, they were blended, and for every 100 pounds of liquid cultures, 20 pounds of lactose (10 to 30 pounds range), 20 pounds of sodium citrate (10 to 30 lbs. range), 30 pounds of nonfat dry milk (10 to 40 pounds range), 5 pounds of cellulose (2.5 to 10 pounds range), and 2.5 pounds of silicon dioxide (1.0 to 7.5 pounds range) were added and thoroughly mixed until the mixture became a doughy mass. The mixture was molded or extruded and then dried at the ambient temperature. Prior to extrusion, an anti-molding compound such as natamycin (primaricin) was included at the rate of 2.5 to 25 grams/100 pounds. The dried culture was milled to a powdery consistency. This portion of the product constitutes the micro-prep.

Detailed Description Text (68):
The micro-prep was prepared by including strains of pseudomonas, streptococcus liquifaciens, Lactobacillus salivarius, strains of Thiobacillus, yeast and non-pathogenic mixed unidentified compost strains. After the cultures were grown, they were mixed together and the pH was adjusted to 7.5 using calcium hydroxide or sodium hydroxide. To 100 pounds of liquid culture, a vegetable flour containing 50 pounds rice flour plus 50 pounds wheat flour was then added, thickening the culture to the consistency of dough. The culture was extruded or formed into small bodies and dried quickly, thus forming the micro-prep. After it was dried, the micro-prep was grated or milled into fine mesh powder. Then, suitable powdered enzymes such as lipase, protease, amylase, cellulase and pectinase were added to the micro-prep, to arrive at 25% to 50% of the total preparation. Fifty percent of the total enzymes were made of protease and lipase.

Detailed Description Text (78):
This experiment evaluated the effect on growth, production, general well being, and reduction of mortality of adding oxy-prep and micro-prep to feed for beef cattle, dairy cattle, poultry, dogs, cats, and pigs. The micro-prep was prepared according to the procedure described under Composition of Micro-Prep, above. The following micro-organisms were grown individually: Lactobacillus acidophilus, Lactobacillus casei, Lactobacillus plantarum, Pediococcus acidolatic, Lactococcus lactis var. lactis, Bifidobacterium bifidus, Lactococcus lactis var Lactis subspecies diacetylactis, streptococcus faecium, Propionibacterium shermanii, Propionibacterium arabinosum and Propionibacterium zeae, Saccharomyces cerevisiae, Aspergillus oryza and Bacillus subtilus. At the end of the growth, the organisms were mixed together, forming a combined liquid culture. Ten gallons of the combined liquid culture was thoroughly mixed with the following ingredients to form a doughy mass: 1.0 pounds of lecithin, 0.1 pounds of sodium propionate, 2.0 pounds calcium carbonate, 2.0 pounds of multi-enzymes, 0.10 pounds of yucca schidigera extract (range 0.01 to 1 pound), 40 pounds of sodium bentonite (range 30 to 60 pounds), 20 pounds of rice flour (range 10 to 30 pounds), and 20 pounds of wheat flour. The pH of the mix was adjusted to 6.5 to 7.5 using sodium hydroxide or sodium bisulfate. The micro-prep was extruded in the form of small pellets. The extruded micro-prep was dried and milled to the consistency of the feed.

Detailed Description Text (79):
The oxy-prep was prepared using the following formula: urea--20 lbs; 2.5 to 10% hydrogen peroxide--100 lbs; lecithin--1 lb; vitamin C--20 grams; guar gum--1 lb; sodium bentonite (range 30 to 60 pounds)--40 lbs; perlite (range 5 to 15 pounds)--10 lbs; rice flour (range 30 to 50 pounds)--40 lbs. The mixture was extruded and dried at room temperature. At the end of the drying, the oxy-prep was milled to the consistency of the appropriate feed.

Detailed Description Paragraph Table (4):
TABLE 8 ______________________________________
Composition of Shrimp Feed INGREDIENT PERCENTAGE TYPICAL RANGE PREFERRED RANGE
______________________________________ Fish Meal 23.5 15 to 45 25 to 40 Soy Bean Meal 32.0 10 to 40 20 to 35 Corn Gluten 15.0 2.5 to 22.5 10 to 20 Wheat Flour 17.0 5.0 to 30.0 7.5 to 20 Whey Powder 5.0 0.10 to 10.0 4 to 6 Pellet Binder 3.0 1.0 to 5.0 2 to 4 Fish-Oil 1.5 0.5 to 2.5 1 to 2 Fish-multi vitamins 0.60 0.2 to 1.5 0.5 to 0.75 and minerals Lecithin 1.35 0.1 to 2.5 0.75 to 1.75 CaCo.sub.3 0.25 0.1 to 2.0 0.2 to 1.5 Egg Digest- 0.25 0.1 to 1.0 0.2 to 0.6 (cholesterol source) Stabilized Vit-C 0.20 0.05 to 0.40 0.1 to 0.3 Sodium Propionate 0.20 0.05 to 0.40 0.1 to 0.3 Powdered yucca- 0.03 0.01 to 1.0 02 to 0.06 schidigera extract Ethoxyguin 0.02 .015 to .1 0.01 to .05 Heat stable multi-enzyme 0.10 0.05 to 0.25 0.075 to 0.15 and multi-mineral mix
______________________________________ (a): Pellet binder supplied by Martin Marietta; brand name is Pel Plus 250A. When the feed was extruded as opposed to pelleting, the pellet binder was not used. (b): Fish multivitamins and stabilized VitC was supplied by Hoffman Laroche. (c): Yucca Schidigera extract was supplied by AllTech, Inc.

CLAIMS:

6. The media system of claim 5, wherein said pellet further comprises an enzyme selected from the group consisting of protease, lipase, amylase, cellulase, pectinase, glucose oxidase, galactose oxidase, lactase, and mixtures thereof.

40. The media system of claim 39, wherein said enzymes are selected from the group consisting of lipase, protease, amylase, cellulase, pectinase, and mixtures thereof.

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L12: Entry 32 of 37 File: USPT Jun 5, 1990

DOCUMENT-IDENTIFIER: US 4931280 A
TITLE: Edible, baked compositions containing cholestyramine

Brief Summary Text (12):
The mono, oligo and polysaccharides present in the baked matrix include among others, an acid hydrolyzed starch binder which functions to form a congealed mass of the ingredients present in the baked matrix. In specific part, the matrix ingredients are baked at a maximum temperature of about 150.degree. C. to about 180.degree. C. for no longer than about 20 minutes. Yet they produce a firm baked composition because of the presence of the starch binder. Moreover, the cholestyramine present inside the baked matrix is substantially prevented from decomposing or degrading.

Detailed Description Text (4):
The saccharides of low to high molecular weights used as ingredients in the baked matrix include a starch binder, a starch, acid hydrolyzed starch, dextrins from high to moderate molecular weight, partially hydrolyzed dextrins of low to moderate molecular weight, simple and complex sugars such as glucose, lactose, fructose, raffinose, galactose, sucrose, invert sugar, honey, molasses, and other similar saccharides oligomers and polymers. In addition, artificial sweeteners such as saccharine, aspartame and other dipeptide sweeteners may be present.

Detailed Description Text (5):
The oligo and polysaccharides include amylose, amylopectin, polydextrins, oligodextrins of from 6 to 14 monomeric units in length, enzyme modified polydextrin, enzyme modified forms of the foregoing polysaccharides and acid and base hydrolyzed forms of the foregoing oligo and polysaccharides. Additional sugars useful as mono and oligo saccharides according to the invention include sorbose, allose, manose, iodose, talose, maltose and the like.

Detailed Description Text (8):
A preferred embodiment according to the invention is a cookie-like baked matrix. This embodiment can be formulated from flour, water, an optional leavening agent, acid hydrolyzed starch binder and edible oil, flavoring, and optional sweetening agent, and oligo and polysaccharides. The flour employed may be selected from wheat, oat, rice, soybean, corn, and other similar grain flours. The sweetening oligosaccharides may include honey, molasses, sucrose, invert sugar, fructose or mixtures thereof. The edible oil may include soybean oil, palm oil and triglycerides.

Detailed Description Text (9):
Another preferred embodiment is a nutritional barlike composition formed as a baked matrix according to the invention. As in the cookie, this nutritional bar will contain such ingredients as the acid hydrolyzed starch binder, cholestyramine, edible oil and mono, oligo and polysaccharides. However, it will also include rolled grains, a lower amount of edible oil and, no flour, but rather solid mono and oligosaccharides such as sucrose, lactose, manose, maltose and dextrins and partially hydrolyzed dextrins.

Detailed Description Text (12):
The weight ratios of ingredients present in the baked matrix medicinal composition according to the invention will in part determine the crispy exterior and the chewy interior of the composition. Moreover, the weight ratios of ingredients permit the congealment, gellation and transformation at a lower temperature relative to those baking temperatures typically used to produce baked products in this field. In

general, it has been found that the weight ratio of edible oil to cholestyramine is from about 1:1 to about 1:4. The weight ratio of mono, oligo and polysaccharides to cholestyramine is from about 10:1 to about 2:1. In similar fashion, the weight ratio of acid hydrolyzed starch binder will be from 5 to 1 to about 1 to 1 relative to the weight of cholestyramine present. In general, the sum of the weights of the acid hydrolyzed starch binder and cholestyramine will be from about 10% to about 50 weight percent of the total composition. The weight ratio of edible oil to mono, oligo and polysaccharides will be from about 1:10 to about 1:2. In general, the acid hydrolyzed starch binder will comprise part of the mono, oligo and polysaccharides; however it may also be present alone or as a separate ingredient.

Detailed Description Text (13):
According to the invention, an especially preferred composition is a baked matrix nutrition bar composed of about 5 to 20 weight percent edible fiber, about 5 to 15 weight percent edible plant oil, about 5 to 25 weight percent polysaccharides selected from starch, dextrin, amylopectin, amylose, hydrolyzed or enzymatically treated forms thereof and mixtures thereof, about 20 to 30 weight percent acid hydrolyzed starch binder, about 10 to 25 weight percent mono or oligosaccharides selected from glucose, fructose, sucrose, invert sugar, lactose, maltose, galactose, hydrolyzed dextrins and mixtures thereof, about 5 to 20 weight percent rolled whole grains, about 5 to 15 percent water, about 5 to 20 percent cholestyramine, about 1 to 2 percent flavoring and spice and the remaining percentage of fruits, nuts, optional protein powder, vitamins and minerals. This composition has a pleasant taste and masks the off-taste of the cholestyramine. Moreover, in this nutrition bar, the exterior surfaces are crispy when the product has been baked at a temperature of about 150.degree. C. for about 5 to 8 minutes. The interior is of a chewy texture.

Detailed Description Text (15):
Another especially preferred composition according to the invention is a baked matrix cookie having a smooth cookie-like texture. This baked matrix cookie is composed of from about 5 to 15 weight percent edible plant oil, about 5 to 25 percent grain flour such as wheat, oat, rye or rice flour, about 20 to 30 weight percent acid hydrolyzed starch binder, about 5 to 20 weight percent sweetner selected from honey, molasses, sucrose, fructose, invert sugar or a mixture thereof, about 5 to 20 weight percent rolled whole grains, about 5 to 20 weight percent cholestyramine, about 2 to 15 weight percent water, flavoring, spice, optional protein powder, vitamins, minerals and other flavoring ingredients such as chocolate, butterscotch chips and nuts.

Detailed Description Text (17):
When the baked matrix according to the invention is to be prepared, the dry ingredients are blended together in a low speed mixing apparatus. These ingredients include the rolled grains, nuts, fruits, the solid mono, oligo and polysaccharides, and other dry ingredients. After the dry ingredients are thoroughly mixed, the fluid or viscous ingredients are combined. These include such ingredients as the edible oil, flavoring, spices, and mono and oligo saccharides such as honey, fructose, invert sugar and water. The combined ingredients are mixed in a low speed mixing apparatus for a period of time sufficient to produce a substantially homogeneous mixture. The acid hydrolyzed starch binder is combined with the mixture of dry and fluid or viscous ingredients after they have been combined into a substantial homogeneous combination.

Detailed Description Text (18):
Alternatively, the dry ingredients and the fluid or viscous ingredients can be combined separately. In this instance, the acid hydrolyzed starch binder will be added to the fluid, viscous mixed ingredients and stirred until a substantially homogeneous combination is produced. Then, the two mixtures are combined and mixed.

Detailed Description Text (19):
Following the thorough mixing of the foregoing ingredients, the appropriate selected amount of cholestyramine is added and the entire combination mixed at low speed for a time sufficient to produce a substantial homogeneous composition. The sticky, viscous composition then extruded as dollops by a wire cutter or other similar extruding apparatus onto a continuous or batch process baking sheets and placed into

a baking oven for a time sufficient to cause the crisping reaction to occur on the exterior surfaces and to produce a chewy texture internally. The oven temperature employed will be from about 80.about. to about 180.about., preferrably about 120.about. to about 160.about. C. and most preferrably about 150.about. C. The time for baking will approximately be from about 10 to about 20 minutes. Preferrably about 14 to 18 minutes in time. It has been found that under these conditions the internal temperature of the baked matrix according to the invention does not reach a high enough temperature to cause decomposition or degradation of the cholestyramine present.

Detailed Description Text (23):
The following dry ingredients were combined in a mixing bowl and mixed for approximately 3 minutes at low speed to produce a substantially homogeneous blend of dry ingredients. In a separate mixing bowl, the fluid and semiviscous ingredients were combined and mixed at low speed to produce a substantially homogenous fluid mixture. The acid hydrolyzed starch binder having the tradename "Starch-Tender G" was combined with the fluid mixture and then further mixed on low speed for approximately 3 minutes until a substantially homogeneous combination was produced. The syrup mixture was added to the dry mixture while blending at low speed for approximately 5 minutes or until a substantially homogenous composition was produced. The sticky, semi-rigid dough was then extruded on a wire-cut machine into bar-like configurations and was baked for approximately 16 minutes at a temperature of about 145.degree. C. to produce a crispy texture, a chewy interior nutritional bar.

CLAIMS:

2. A composition according to claim 1 wherein the mono, oligo and polysaccharides include an acid hydrolyzed starch binder.

4. A composition according to claim 1 wherein the mono, oligo and polysaccharides are selected from starch binder, starch, acid hydrolyzed starch, dextrins, partially hydrolyzed dextrins, simple and complex sugars, enzymatically treated forms thereof, and mixtures thereof.

9. A composition according to claim 1 wherein the mono, oligo and polysaccharides comprise sucrose, fructose, glucose, lactose, invert sugar, amylase, amylopectin, polydextrin, enzymatically modified polydextrin or mixtures thereof.

10. A composition according to claim 1 wherein the baked matrix is a nutrition bar and comprises rolled whole grain, natural milled fiber, sucrose, fructose, grain starch, acid hydrolyzed grain starch, flavoring and cholestyramine.

16. A composition according to claim 1 wherein the baked matrix is a nutrition bar comprising about 5-20% edible fiber, about 5-15% edible plant oil, about 15-25% polysaccharides selected from starch, dextrin, amylopectin, amylose, hydrolyzed forms thereof, enzymatically treated forms thereof and mixtures thereof, about 20-30% acid hydrolyzed starch binder, about 10-25% mono or oligosaccharides selected from glucose, fructose, sucrose, invert sugar, lactose, hydrolyzed dextrins and mixtures thereof, about 5-20% rolled whole grains, about 5-15% water, about 5-20% cholestyramine, 1-2% flavoring and spice and a remaining percentage of fruit and nuts, the percents being weight percents of the total composition.

17. A composition according to claim 1 wherein the baked matrix is a cookie comprising about 5-15% edible plant oil, about 15-25% flour, about 20-30% acid hydrolyzed starch binder, about 5-20% sweetener selected from honey, molasses, sucrose, fructose, invert sugar or a mixture thereof, about 5-20% rolled whole grains, about 5 to 20% cholestyramine, 2-15% water, flavoring and spice, the percentages being weight percentages of the total composition.

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L12: Entry 19 of 37 File: USPT May 7, 1996

DOCUMENT-IDENTIFIER: US 5514404 A
TITLE: Tenderized baked good production with reduced fat, low fat, or no added fat

Brief Summary Text (8):
In the process of U.S. Pat. No. 5,108,764, the added fat or shortening content of a mass-produced cracker is reduced using water and an enzyme composition that hydrolyzes non-cellulosic cell wall polysaccharides. The enzymatic treatment and the amount of water are such so as to avoid excessive gelatinization during baking.

Brief Summary Text (17):
In preferred embodiments of the invention for making crackers, an enzyme composition having activities for hydrolyzing non-cellulosic cell wall polysaccharides, such as a pentosanase or xylanase enzyme composition, is included in the cracker dough to reduce starch gelatinization.

Detailed Description Text (13):
Commercially available lecithin is preferred for use in the present invention. Commercial grades generally contain about 2.2% phosphorus. Lecithin is prepared commercially primarily from soybean oil. It exists preformed as a contaminant in crude soybean oil, and the commercial method of preparation involves precipitation from the oil and subsequent purification. It may be further processed by bleaching, fractionation, hydrolysis, acetylation, extraction, hydroxylation, and the like. Soybean lecithin may contain about 11.7% palmitic acid, about 4% stearic acid, about 8.6% palmitoleic acid, about 9.8% oleic acid, about 55% linoleic acid, about 4% linolenic acid, and about 5.5% C.sub.20 to C.sub.22 acids, including arachidonic acid.

Detailed Description Text (23):
The flour component or farinaceous materials may be any comminuted cereal grain or edible seed or vegetable meal, derivatives thereof and mixtures thereof. Exemplary of the flour component or farinaceous materials which may be used are wheat flour, corn flour, corn masa flour, oat flour, barley flour, rye flour, rice flour, potato flour, grain sorghum flour, tapioca flour, graham flour, or starches, such as corn starch, wheat starch, rice starch, potato starch, tapioca starch, physically and/or chemically modified flours or starches, such as pregelatinized starches, and mixtures thereof. The flour may be bleached or unbleached. Wheat flour or mixtures of wheat flour with other grain flours are preferred. The amount of flour used in the compositions of the present invention ranges, for example, from about 30% by weight to about 80% by weight, preferably from about 45% by weight to about 75% by weight, based upon the weight of the dough. Unless otherwise indicated, all weight percentages are based upon the total weight of all ingredients forming the doughs or formulations of the present invention, except for inclusions such as flavor chips, nuts, raisins, and the like. Thus, "the weight of the dough" does not include the weight of inclusions.

Detailed Description Text (26):
Process-compatible ingredients, which can be used to modify the texture of the products produced in the present invention, include sugars such as sucrose, fructose, lactose, dextrose, galactose, maltodextrins, corn syrup solids, hydrogenated starch hydrolysates, protein hydrolysates, glucose syrup, mixtures thereof, and the like. Reducing sugars, such as fructose, maltose, lactose, and dextrose, or mixtures of reducing sugars may be used to promote browning. Fructose is the preferred reducing sugar, because of its ready availability and its generally more enhanced browning and flavor-development effects. Exemplary sources of fructose include invert syrup, high fructose corn syrup, molasses, brown sugar, maple syrup,

mixtures thereof, and the like.

Detailed Description Text (28):
In addition to the humectant sugars, other humectants, or aqueous solutions of humectants which are not sugars or possess a low degree of sweetness relative to sucrose, may also be employed in the dough or batter. For example, glycerol, sugar alcohols such as mannitol, maltitol, xylitol and sorbitol, and other polyols, may be used as humectants. Additional examples of humectant polyols (i.e. polyhydric alcohols) include glycols, for example propylene glycol, and hydrogenated glucose syrups. Other humectants include sugar esters, dextrins, hydrogenated starch hydrolysates, and other starch hydrolysis products.

Detailed Description Text (37):
In embodiments of the present invention, enzymatic treatment may be used to alter the water-holding non-cellulosic, cell-wall polysaccharides such as pentosans and/or betaglucans in the dough environment. Pentosans, for example, hold a lot of water, even though they amount to only a minor fraction of the dough. Hydrolyzing the pentosans, or other hemicelluloses so they permit release of water from the dough before the starch gelatinization temperature is reached during baking, helps to lower the amount of gelatinization of starch. Water released from the pentosans, but not from the dough during baking, may interact with the emulsifier composition. This may contribute to, or provide a portion of, the liquid phase which lubricates the dough and entraps air.

Detailed Description Text (39):
The pentosanase content of hemi-cellulase enzymes is preferably measured as xylanase units of activity (XAU). The assay principle is this: xylanase activity is determined by the manufacturer with a simple colorimetric assay. A commercially available, soluble, dyed xylan is hydrolyzed, and the small molecular weight fragments are not precipitated by ethanol, leaving a colored supernatant. Xylanase activity of PEN #3 concentrate, for example, is about 10,250.+-.750 XAU/ml. Exemplary amounts of the enzyme composition used in the present invention may range from about 200 to about 1500 XAU/lb flour, preferably from about 900 to about 1300 XAU/lb flour.

Detailed Description Text (69):
The doughs or batters are generally prepared at a temperature of less than about 115.degree. F. They may be cooled using ice as a portion of the added water. Solid or liquid carbon dioxide may also be used to cool the dough or batter. Exemplary dough or batter temperatures may range from about 60.degree. F. to about 77.degree. F. Before being shaped or extruded, the dough or batter may be permitted to lay for about 20 minutes to about 120 minutes to hydrate and achieve optimum consistency, in order to control oven spread and to facilitate transfer and forming operations.

Detailed Description Text (71):
In embodiments of the present invention, a calender press, an extruder, or continuous mixer may be utilized to form the dough or dough-like mixture into a continuous rope. Preferably, the screws of the extruder will be co-rotating, i.e., rotating in the same direction. Co-rotating twin-screw elements generally provide thorough mixing and conveying of the components, with the elements of one screw continuously wiping the other screw. This is particularly advantageous when the composition being mixed has a relatively high viscosity.

Detailed Description Text (72):
Suitable extruders which may be used in the present invention include: (1) WENGER model series TX by Wenger of Sabetha, Kansas, (2) model series MPF by Baker Perkins, (3) model series BC by Creusot Loire of Paris, France, and 4) model series ZSK or Continua by Werner and Pfleiderer. Single-screw extruders, including those with a screw that oscillates horizontally during rotation (i.e. a Buss kneader by Buss of Pratteln, Switzerland), may also be used in accordance with the present invention.

Detailed Description Text (73):
A continuous mixer for use in the present invention comprises co-rotating screws and jacketed barrels with heating and/or cooling means. A continuous mixer is similar in construction to a cooker-extruder, except that for the same screw diameter, a

continuous mixer has a greater free internal volume and thus operates to mix and convey ingredients at relatively lower pressures and shear than does an extruder, to obtain a substantially homogeneous output. A continuous mixer which may be used is model ZPM-120 by Werner and Pfleiderer.

Detailed Description Text (74):
Filled products may be produced in accordance with the present invention by coextruding the dough, batter, or dough-like mixture with filler materials. The co-extrudate may be formed by the use of a concentric die or a tube inserted within the die orifice. Filled products may also be produced by transporting the dough-like mixture to a conventional enrobing or encrusting machine, such as produced by the Rheon Manufacturing Company, for filling with a filler material. The filled dough pieces may have a weight ratio of the filler to the casing dough within the range from about 0.4-1.6:1.

Detailed Description Text (76):
The cutting of dough ropes or extrudates before or after baking may be performed by a guillotine-cutter, a band-cutter, fluid-jet cutter, or the like.

Detailed Description Text (88):
The dough is formed by first creaming all the dough ingredients except the wheat flour, the amylase, protease, leavening agents, and a portion of the water. The polysorbate 60 and natural flavorant are added as the commercially available premix of Example I. The flour is added to the creamed mixture, then the sodium bicarbonate is sieved on top of the flour, followed by mixing. Then the protease and amylase enzymes and ammonium bicarbonate (each dispersed in a separate portion of the remaining water) are added. The ingredients are mixed, then proofed for 2-4 hours. The proofed dough is then sheeted, laminated, reduced in thickness between counter-rotating rolls, cut into pieces with a rotary cutter, and baked to a moisture content of about 0.5% by weight to about 2.5% by weight. The topping ingredients are then applied, thus obtaining a tender cracker having a 35% reduction in fat content.

Detailed Description Paragraph Table (3):
______________________________________ Dough Ingredients Parts by weight
______________________________________ Wheat flour 100 (about 13% by weight water) Sucrose 5.55 Soybean oil shortening 3.00 Whey powder 3.00 Glucose syrup (43 BE/62 DE) 1.78 Minor ingredients 2.00 (salt, butter flavor, amylase, protease) Ammonium bicarbonate 1.33 Sodium bicarbonate 0.33 Sodium stearoyl lactylate 0.50 Fluid unbleached soybean lecithin 0.125 (as in Example 1) Polysorbate 60 0.25 Natural flavorant 0.75 (as in Example 1) Water 32.5 TOTAL 151.115
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DOCUMENT-IDENTIFIER: US 5435714 A
TITLE: Apparatus for the production of three-dimensional food products

Abstract Text (1):
Three-dimensional food products such as crackers, cookies, puffed snacks, puffable glassy half-products, pet foods, pasta, confections such as chewing gum, and ready-to-eat cereals are produced on a mass production basis by feeding a dough or other food composition to a plurality of dies which shape it into ropes. The shaped extrudate ropes obtained from each die are cut by a plurality of first blades which pass across only a portion of each of the orifices of the dies to partially cut each of the shaped extrudate ropes. A plurality of second blades pass across the entire orifice of each of the dies to completely cut each of the partially cut extrudate ropes into individual pieces. The use of a multi-port extrusion die permits higher mass flow rates and thus greater dough piece production rates at lower cutter speeds. The use of multi-port extrusion and lower cutter speeds increases shape, definition, and accuracy of cutting and reduces scattering and deformation of the individual pieces. The plurality of extrudate ropes are preferably cut simultaneously. The plurality of dies may be fed by a calendar press or preferably an extruder. In embodiments of the present invention, the blades may be arranged or mounted on a continuous band, a reciprocating or oscillating cutter which moves in a closed path, or a rotating shaft. The doughs which are cut into three-dimensional pieces may be raw, partially cooked or baked, or fully cooked or expanded. In the production of three-dimensional crackers, the amount of water and enzymes are used to increase the expandability or leavening ability of extruded cracker doughs.

Brief Summary Text (4):
The production of three-dimensional farinaceous-based food products using an extruder and rotating knives of different lengths is disclosed in U.S. Pat. No. 4,802,838 to Schaaf, Japanese Laid-Open Patent No. 61-274673 (published Dec. 4, 1986), and Japanese Laid-Open Patent No. 61-280260 published Dec. 10, 1986 both to Hoki and assigned to Ohyama Foods Machinery Co., Ltd. A short knife is used to partially cut or make grooves in the extrudate as it exits the extruder. A long knife fully cuts the partially cut extrudate into pieces. However, all of the knives cut the extrudate from only a single die orifice.

Brief Summary Text (5):
To increase production rates of the individual pieces, the extrusion rate through the single orifice must be increased together with an increase in speed of rotation of the long and short knives. However, as these rates increase, cutting accuracy tends to decrease, and the pieces tend to get thrown with greater force which can result in excessive deformation or damage to the pieces. Production rates may be increased by adding more single orifice extruders to the production line. However, the cost involved in using multiple extruders may be prohibitive.

Brief Summary Text (6):
U.S. Pat. No. 4,966,542 to Kobayashi discloses apparatus for the formation of a shaped food product wherein two pairs of cutters are used to reduce production loss caused by scattering of cut food by centrifugal force. Each cutter rotates about its own axis and revolves orbitally. According to the Kobayashi patent, even if the cutters make their serf rotation and orbital revolution at high speed, it does not cause scattering of food material, therefore making high speed production possible. However, the apparatus of U.S. Pat. No. 4,966,542 does not partially cut the extrudate to obtain three-dimensional shaped products.

Brief Summary Text (7):

U.S. Pat. No. 4,920,572 to Repholz et al discloses a multi-orifice coextrusion method and apparatus for preparing dual-textured pet food. The multi-orifice coextruding apparatus comprises a slicing means which functions to slice the center-filled stream as it is discharged from the die passages. A preferred slicing means is a rotating knife assembly which comprises about six to eight knives which are mounted on a hub which, in turn is mounted on a shaft disposed at about the center point of the die. According to Repholz et al the apparatus advantageously comprises a hood or cage-type element to prevent product which is sliced from the center-filled stream at high rates from being thrown in undesirable directions by the action of the rotating knife assembly. However, the Repholz et al patent does not disclose the production of partially cut extrudate pieces.

Brief Summary Text (8):
Multi-orifice extruders are also known in the pretzel extrusion art. However, like the Repholz et al apparatus and method, known pretzel extruders do not provide for partial cutting of the extrudate to obtain three-dimensional pieces.

Brief Summary Text (9):
The present invention provides a method and apparatus for the mass production of three dimensional food products, such as crackers, glassy half-products, puffed or fully expanded snacks, ready-to-eat cereals, confections, and pet foods in four-legged standable animal or other shapes. The three-dimensional food products are produced using one or more multi-orifice extruders to increase production rates while reducing cutter speeds to prevent undesirable scattering and deformation of the pieces.

Brief Summary Text (11):
The present invention provides apparatus and a method for the production of three-dimensional food products such as crackers, cookies, puffed snacks, glassy half-products which are expandable upon subsequent heating, ready-to-eat cereals, confections, pasta, and pet foods on a mass production basis. A farinaceous-based dough or confectionery composition is fed to a plurality of dies which shape the food composition into at least one shape conforming to the orifices of the dies. The shaped extrudate rope obtained from each die is cut by a first cutting means which passes across only a portion of each of the orifices of the dies. The first cutting means thus only partially cuts each of the shaped extrudate ropes. Second cutting means pass across the entire orifice of each of the dies to completely cut each of the partially cut extrudate ropes into individual pieces. The dough or confectionery pieces which are obtained are three-dimensional in that they are partially cut at an angle transverse to the direction of extrusion.

Brief Summary Text (12):
The use of a multi-port extrusion die permits higher mass flow rates and thus greater dough piece production rates at lower cutter speeds. The use of lower cutter speeds increases accuracy of cutting and reduces scattering of the pieces. The larger the number of die orifices at a given production rate, the slower is the rate of flow through each orifice. The slower rates increase shape definition of the extrudates. Deformation of the individual pieces is also reduced by decreasing the speed at which they impact equipment parts upon being cut. In addition, the use of multiple orifices permits the use of lower pressure for a given production rate which positively impacts the texture of the final product. The plurality of dies may be fed by a calendar press or preferably an extruder, most preferably an extruder with a plurality of conveying screws.

Brief Summary Text (13):
In embodiments of the present invention, the first and second cutting means may be arranged or mounted on: a) a continuous or endless band or chain, b) a reciprocating or oscillating frame which moves in a closed path, or c) a rotating shaft. The continuous or endless band or chain and reciprocating or oscillating cutter embodiments are preferred because the cutting motion imparts a lateral or straight line force rather than a centrifugal force to the dough pieces as they are cut. The lateral force provides for more uniform controlled distribution of the pieces, for example, on to a conveyor belt. It also tends to reduce shape deformation of the pieces. The continuous band or chain and oscillating cutter arrangement also can be used to cut the extrudates from dies which are arranged in two or more rows thereby

increasing production over a rotating cutter. Embodiments which use a continuous band or chain are preferred because higher production rates may be achieved by the continuous movement of the cutters across the die orifices compared to the movement achieved in the oscillating cutter embodiments. A continuous or endless chain is most preferred for holding of the first and second cutting means.

Brief Summary Text (18):
High extrusion pressures tend to change the air cells in a dough. Generally the greater the pressure the lesser the degree of expansion upon subsequent baking and the harder the texture of the cracker. It has been found that cracker doughs having: 1) a water content of from about 15% by weight to about 35% by weight, preferably front about 17% by weight to about 21% by weight of the dough, most preferably from about 18% by weight to about 20% by weight of the dough, and 2) from about 9 grams to about 20 grams, preferably from about 11 grams to about 17 grams of proteolytic enzyme per 100 lbs of the flour are extrudable doughs which retain their shape during transport to baking ovens and are bakeable into a tender cracker.

Drawing Description Text (9):
FIG. 5D is a bottom view of a preferred single blade support with a preferred long blade or cut off blade secured therein for complete cutting off of the extrudates.

Drawing Description Text (13):
FIG. 5H is a bottom view of a preferred short blade for partial cutting of the extrudates which may be secured in the preferred blade support of FIGS. 5D through 5G.

Detailed Description Text (2):
The apparatus for the production of three-dimensional food products in accordance with the present invention comprises: 1) first cutting means, such as at least one short blade, for only partially cutting each of a plurality of shaped extrudate ropes, and 2) second cutting means, such as at least one long or cut off blade, for completely cutting each of a plurality of the partially cut extrudate ropes to obtain three-dimensional food pieces. In preferred embodiments, the partial cutting and the complete cutting are within generally parallel planes of each extrudate. The first and second cutting means may form part of or be attached, mounted or arranged on a continuous or endless loop, belt, band or chain in embodiments of the present invention. In other embodiments, the cutting means may be held by or form part of a reciprocating or oscillating frame or be mounted on a rotating shaft. The first and second cutting means are preferably mounted on at least one endless or continuous chain or band, most preferably at least one endless or continuous chain.

Detailed Description Text (3):
A continuous or endless chain multi-orifice cutting apparatus 1 for producing three-dimensional food products in accordance with the present invention is shown in FIG. 1. The apparatus comprises an extruder 2 which feeds a dough through elbow 4 to die head or die plate 6 which is located at the bottom end of elbow 4. In the production of crackers, the extruder 2 is preferably a modified pretzel extruder containing one or more sets of individual, non-intermeshing screws 3 (shown in FIG. 2) for feeding dough through the elbow 4 to the die head 6. A hopper (not shown) is used to feed the dough to the extruder screws 3.

Detailed Description Text (4):
In embodiments of the present invention, the cracker dough or other dough may be fed to the die head or die plate 6 by means of a continuous mixer, or counter-rotating rolls, such as those of a calender press, instead of by an extruder 2. An extruder is the preferred means for feeding the dough through the dies.

Detailed Description Text (5):
The dough may be produced in at least one mixing apparatus such as a batch mixer, continuous mixer, or extruder, and then transferred to the forming or shaping extruder 2 via the hopper. In other embodiments of the present invention, the dough ingredients may be added to and mixed to form a dough within an extruder or continuous mixer having a plurality of dies which are in association with the first and second cutting means.

Detailed Description Text (6):
In the production of partially cooked products, half-products, or fully expanded products such as ready-to-eat cereals and puffed snacks, a cooker extruder is preferably used to cook and feed the food composition to the die head 6.

Detailed Description Text (7):
In the production of three-dimensional chewing gums, a conventional chewing gum extruder may be used to feed the gum composition to the die plate 6.

Detailed Description Text (9):
In the embodiment of FIG. 1, two rows of dies or die inserts 8, 10 are incorporated into the die plate 6 which is oriented for downward, vertical extrusion of the extrudate. Although this arrangement is preferred, the invention may be practiced with one row of dies or more than two rows of dies. It may also be practiced with horizontal extrusion of the extrudate. The downstream dies or die inserts 8 may be different from the upstream dies or die inserts 10 to provide a mixture of differently shaped farinaceous-based dough pieces 110. Also, the dies within a given row may be differently shaped. Each die may have an adjustment device to increase or decrease the flow rate of the dough mass in order to compensate for different shaped dies. The extrudates from the downstream row of dies 8 are cut by the downstream short blades 12a and downstream long blades or cut off blades 16a. The extrudates from the upstream row of dies 10 are cut by the upstream short blades 12b (not shown in FIG. 1) and the upstream long blades or cut off blades 16b.

Detailed Description Text (11):
The blades on each chain are preferably about equally spaced along the length of each chain so as to obtain three-dimensional dough pieces wherein the partially cut portions further removed from the die plate and the partially cut portions closest to the die plate have substantially the same thickness. However, the blades may be unequally spaced to provide different thicknesses to the partially cut sections in the direction of extrusion. Each chain is preferably provided with at least one short blade and at least one long blade per die. This arrangement permits simultaneous cutting of the extrudates from the dies of each row. Also, for a given chain length, the greater the ratio of blades to dies, the higher the production rates can be at a given chain or cutter speed.

Detailed Description Text (18):
The chain height adjusting supports 50, 52 are vertically adjustable to position the blades 12a, 12b, 16a, and 16b up against the die end plate 16 for cutting the extrudate dough as it exits the orifices of the downstream and upstream dies 8 and 10. Downward movement of the chain height adjusting supports 50, 52 lowers the blades 12a, 12b, 16a and 16b for adjustment, cleaning, or replacement. As shown in FIGS. 1, 3, and 4, the chain height adjusting supports 50, 52 comprise vertical supports 54, horizontal supports 56, and vertical back plates 58. Vertical supports 54 are connected to vertical back plates 58 by horizontal supports 56 to provide a generally U-shaped structure. Bearing assemblies 32 are attached to vertical supports 54 and vertical back plates 58. Upper sprocket wheel axles 30 thus bridge vertical supports 54 and vertical back plates 58.

Detailed Description Text (21):
The chain guide assemblies 72, shown in FIG. 1 through 4, for example, provide vertical and horizontal stability to the chains 20, 22 and the blades 12a, 12b, 16a, and 16b attached to the chains for accurate and consistent cutting of the extrudates as they exit the dies 8, 10.

Detailed Description Text (28):
As shown in FIG. 6C, the non-abutting leg or side of the L-shaped chain guides 74', 75' form a channel or a slot through which the chains 20', 22' pass. The channel or slot is above the plane through which the blades 12a', 12b', 16a', and 16b' travel as they cut the extrudates from the dies 8, 10. The upper chain guides 74' limit upward as well as lateral movement of the chains 20', 22'. Longitudinal grooves or channels 78' may be provided in the lower chain guides 75' to accommodate blade holding bolts or screws 14' which fasten the blades 12a', 12b', 16a', 16b' to single blade supports 17a'. The blade supports 17a' are fastened to the chains 20',22' via L-shaped blade support connectors 23' as shown in FIG. 5C and 6C.

Detailed Description Text (46):
A preferred single blade support 117 and preferred long blade 119 for attachment to downstream chain 20' for complete cutting of the extrudate ropes are shown in FIGS. 5D, 5E, 5F, and 5G. As shown in these figures, the long blade 119 is secured to the bottom 121 of the blade support 117 by a bolt assembly 120. The blade 119 abuts the bottom of the support 117 between two ridges: leading ridge 123, and trailing ridge 125. The ridges 123, 125 of the blade support 117 may have chamfered ends 126 as shown in FIGS. 5D and 5G.

Detailed Description Text (53):
As shown in FIG. 5F and 5G, the blade support 117 and bolt assembly 120 bottom-most surfaces are preferably flush with the bottom-most surface of the long blade 119 when the blade 119 is secured in the support 117. In this preferred embodiment, the, blade support, 117 and blade 119 when assembled, provide a flat surface for contact with and guidance by lower chain supports such as supports 75' shown in FIG. 6C. However, the channels or grooves 78' in the lower chain guide 75' shown in FIGS. 5C and 6C would not be needed because of the flat or flush assembly of the pieces. The top surface of the blade 119 is preferably essentially flat so that the cutting edge 134 cuts the extrudate essentially at the die orifice to avoid entrapment it or smearing of the extrudate between the blade top surface and the die.

Detailed Description Text (56):
The blade support 117 shown in FIGS. 5D through 5G may be used to support the preferred short blade 160 shown in FIGS. 5H through 5M. Preferably, the blade support 117 and blade 160 when assembled, provide a flat surface for contact with and guidance by lower chain supports such as lower chain supports 75' shown in FIG. 6C. Also, the blade surface which faces the die 8, 10 is preferably essentially flat at least in the portion of the blade 160 which passes over the die orifice so that the cutting edge 174 partially cuts the extrudate essentially at the die orifice. The flat upper or die-facing surface avoids entrapment or smearing of the extrudate between the die facing surface of the blade 160 and the die 8, 10.

Detailed Description Text (60):
As shown in FIG. 5I, the angle .alpha. formed by the cutting edge 174 and the adjoining front or leading non-cutting edge 172 of the short blade 160 is 0.degree.. Thus, the cutting edge 174 and the non-cutting leading edge 172 are in a straight line. The angle .beta. it formed by the cutting edge 174 and the direction of movement of the short blade 160 across the die orifice 8 (not shown) is about 90.degree. as shown in FIG. 51. The angle gamma (.gamma.) formed between the trig edge 176 of the short blade 160 and the direction of travel of the short blade 160 may be about 45.degree. and may range from about 0.degree. to, about 60.degree., preferably about 35.degree. to about 50.degree., when the angle a is 0.degree.. However, the angle .alpha. for the short blade 160 may also range up to about 60.degree.. Increasing the angle .alpha. results in a more gradual cutting of the extrudate.

Detailed Description Text (61):
As shown in FIGS. 5H, 5I, and 5K, the cutting edge 174 of the short blade 160 is relatively small compared to the length of the blade. Minimizing the length of the cutting edge 174 is preferred because it tends to reduce vertical wobbling of the short blade 160. The length of the cutting edge 174 may, for example, be from about 1 up to about 5 times, preferably about 1.5 to about 3 times, the depth-of-cut in the extrudate. Increasing the length of the cutting edge 174 allows for a greater number of blade sharpenings.

Detailed Description Text (62):
The maximum thickness of the cutting portion 178 of the short blade 160 is limited by the degree of spread desired between the legs or protrusions formed in the extrudate. If the section of cutting portion 178 which passes through the extrudate is too thick, the legs may be caused to spread excessively. However, as the thickness of the cutting portion 178 is reduced, wobbling of the blade tends to increase. Therefore, in the preferred embodiments of the present invention, the cutting portion 178 of the short blade 160 is made small and thin while keeping a thicker portion for the remaining or non-cutting pan of the blade. Maintaining a

large, thick non-cutting portion of the blade helps to strengthen it and reduce vertical wobbling.

Detailed Description Text (70):
FIG. 8 is a schematic bottom view of a continuous chain or band cutter 190 showing a blade arrangement for producing three-dimensional elephants. The continuous chain or band cutter 190 both partially and completely cuts the extrudates from two rows of dies 8 and 10. Both the downstream dies 8 and the upstream dies 10 have orifices in the shape of a side view of an elephant. The continuous chain or band cutter 190 comprises downstream chain or band 20 and upstream chain or band 22. Single-edged downstream short blades 12a and long blades 16a are mounted in alternating positions on downstream chain or band 20. Single-edged upstream short blades 12b and long blades 16b are mounted on alternating positions on upstream chain or band 22. The chains or bands 20, 22 and blades 12a, 12b, 16a, 16b are driven in a straight path across the die orifices as shown by the arrows in FIG. 8.

Detailed Description Text (71):
The blades 12a, 12b, 16a, and 16b are positioned on the chains or bands 20, 22 so that: a) downstream short blades 12a simultaneously partially cut the extrudate ropes extruded from downstream dies 8, b) upstream short blades 12b simultaneously partially cut the extrudate ropes from upstream dies 10, c) downstream long blades 16a simultaneously completely cut the partially cut extrudate ropes extruded from downstream dies 8 to obtain a row of three-dimensional dough pieces, and d) upstream long blades 16b simultaneously cut the partially cut extrudate ropes extruded from upstream dies 10 to obtain another row of three-dimensional dough or confectionery pieces. The partial cuts and the complete cuts are all made in the same direction by cutting edges 192 and 193, respectively.

Detailed Description Text (72):
The path traveled by the tips or ends of short blades 12a, 12b is shown by the dotted lines 195 for each row of dies 8, 10. The short blades 12a, 12b partially cut each of the extrudates so as to form two individual legs on one side of the elephant-shaped extrudate without completely severing the extrudate as it continues to exit the die.

Detailed Description Text (73):
The path traveled by the tips or ends of the long blades 16a, 16b is shown by the dotted lines 197 for each row of dies 8, 10. The long blades 16a, 16b completely cut or sever the elephant-shaped extrudates which were partially cut by the short blades 12a, 12b. Complete severance by the long blades 16a, 16b forms two additional individual legs on the other side of the extrudate to obtain a three-dimensional elephant-shaped piece having four individual legs.

Detailed Description Text (75):
In other embodiments of the present invention, the blades which perform the partial cutting and the blades which perform the complete cutting of the extrudates move in a generally rectangular path in a plane which is generally parallel to the die plate 6. In these embodiments, the cutter reciprocates or oscillates so that the partial cutting and the complete cutting of the extrudate ropes is performed in opposite cutting direction. The blades which perform the partial cut and the blades which perform the complete cut may be the same or different. When the partial cutting and the complete cutting blades are the same, the blades have two opposing cutting edges. Embodiments of the oscillating or reciprocating cutter may be used to partially cut and to completely cut extrudates from a single row of dies or a plurality of rows of dies.

Detailed Description Text (76):
In the embodiment schematically shown from the bottom in FIG. 9 the reciprocating or oscillating cutter 200 both partially and completely cuts the extrudates from two rows of dies 208 and 210. Both the downstream dies 208 and upstream dies 210 have orifices in the shape of a side view of an elephant. The reciprocating cutter 200 comprises blade support frame 212. The blade support frame 212 is generally rectangular in shape and comprises two generally parallel longitudinal members 214 and 215 which are connected by side members 216 at their ends. Double-edged downstream blades 218 and double-edged upstream blades 220 are mounted upon

downstream longitudinal member 214 and upstream longitudinal member 215, respectively.

Detailed Description Text (77):
The frame 212 and the blades 218, 220 are driven in a generally rectangular path as illustrated by the arrows A to B, B to C, C to D, and D to A in FIG. 9. In stroke A to B, for example, the frame 212 and blades 218, 220 are moved so that: a) downstream blades 218 pass across the entire orifices of downstream dies 208, and b) upstream blades 220 pass across the entire orifices of upstream dies 210 to completely cut each of the elephant-shaped extrudate ropes. Each of the blades 218, 220 may pass across a single die 208, 210, respectively, or a plurality of dies 208, 210, respectively. Preferably, each blade moves across only one die. During cutting stroke A to B cutting edge 222 completely cuts the extrudate ropes into individual pieces. At startup, this stroke serves to remove extrudate from the dies to obtain a steady flow. When a steady flow is obtained, stroke A to B serves to cut the partially cut extrudates from a previous cycle into individual elephant-shaped pieces having four individual legs.

Detailed Description Text (78):
In FIG. 9, the blades 218, 220 are shown at the end of stroke A to B and the beginning of stroke B to C. During stroke B to C, the frame 212 and the blades 218, 220 are simultaneously moved downstream into position for partial cutting of the extrudate ropes. During stroke B to C, the blades 218, 220 are located between the orifices of the dies 208, 210, respectively so that the extrudates are not cut.

Detailed Description Text (79):
During stroke C to D, each of the extrudates is partially cut so as to form two individual legs on one side of the elephant-shaped extrudate without completely severing the extrudate as it continues to exit the die. The partial cutting during stroke C to D is performed by cutting edges 224. The path traveled by the tops or ends of downstream blades 218 during stroke C to D is shown by the dotted line 226. The path traveled by the tops or ends of the upstream blades 220 during stroke C to D is shown by dotted[line 228.

Detailed Description Text (80):
At the end of stroke C to D and the beginning of stroke D to A, the blades 218 and 220 are located between successive die orifices in a given row of dies. During stroke D to A, the frame 212 and blades 218, 220 are moved upstream back to their position at the start of stroke A to B without cutting the extrudates. Stroke A to B then completely severs the elephant-shaped extrudate which was partially cut in the previous stroke C to D. Complete severance during stroke A to B forms two additional individual legs on the other side of the extrudate to obtain a three-dimensional four legged elephant-shaped piece.

Detailed Description Text (81):
The simultaneous cutting of extrudates from more than two rows of dies can be achieved by constructing a blade support frame with three or more longitudinal members which are connected at their ends by side members. The number of longitudinal members would equal the number of rows of dies. Each of the longitudinal members would carry double-edged blades for partial cutting and complete cutting of the extrudates.

Detailed Description Text (82):
In the oscillating cutter embodiment schematically shown from the bottom in FIG. 10, the blades which perform the partial cut and the blades which perform the complete cut are different blades. The reciprocating cutter 300 both partially and completely cuts the extrudates from two rows of dies 308, and 310. Both the downstream dies 308 and upstream dies 310 have orifices in the shape of a side view of an elephant. The reciprocating cutter 300 comprises blade support frame 312. The blade support frame 312 is generally rectangular in shape and comprises three generally parallel longitudinal members 313, 314, and 315 which are connected by side members 316 at their ends. For a given row of dies 308 or 310, the single-edged short blades 318 are mounted upon a different longitudinal member than the single-edged long blades 320. Single-edged short blades 318 are mounted upon the downstream longitudinal member 313 and the upstream side 319 of the central longitudinal member 314.

Single-edged long blades 320 are mounted on upstream longitudinal member 315 and on the downstream side 321 of central longitudinal member 314.

Detailed Description Text (83):
The frame 312 and the blades 318, 320 are driven in a generally rectangular path as illustrated by the arrows A to B, B to C, C to D, and D to A in FIG. 10. In stroke A to B, for example, the frame 312 and blades 318, 320 are moved so that: a) long blades 320 which are attached to central longitudinal member 314 pass across the entire orifices of downstream dies 308, and b) long blades 320 which are attached to upstream longitudinal member 315 pass across the entire orifices of upstream dies 310 to simultaneously completely cut each of the elephant-shaped extrudate ropes. Each of the blades 318, 320 may pass across a single die 308, 310, respectively, or a plurality of dies 308, 310, respectively. Preferably, each blade moves across only one die to reduce cutter speeds for a given mass flow rate of extrudate and given dough piece thickness. During cutting stroke A to B cutting edge 322 completely cuts or severs the extrudate ropes. The blades 318, 320 are shown at the end of stroke B to C and the beginning of stroke C to D.

Detailed Description Text (84):
During stroke B to C, the frame 312 and the blades 318, 320 are simultaneously moved upstream into position for partial cutting of the extrudate ropes. During stroke B to C, the blades 318, 320 are located between the orifices of the dies 308, 310, respectively so that the extrudates are not cut.

Detailed Description Text (85):
During stroke C to D each of the extrudates is partially cut so as to form two individual legs on one side of the elephant-shaped extrudate without completely severing the extrudate as it continues to exit the die. The partial cutting during stroke C to D is performed by cutting edges 324. The path traveled by the tips or ends of short blades 318 during stroke C to D is shown by the dotted lines 326 for each row of dies 308, 310. The path traveled by the tips or ends of the long blades 320 during stroke A to B is shown by dotted lines 328 for each row of dies 308, 310.

Detailed Description Text (86):
At the end of stroke C to D and the beginning of stroke D to A, the blades 318 and 320 are located between successive die orifices in a given row of dies. During stroke D to A, the frame 312 and blades 318, 320 are simultaneously moved downstream back to their position at the start of stroke A to B without cutting the extrudates. Stroke A to B then completely severs the elephant-shaped extrudate which was partially cut in the previous stroke C to D. Complete severance during stroke A to B forms two additional individual legs on the other side of the extrudate to obtain a three-dimensional elephant-shaped piece having four individual legs.

Detailed Description Text (87):
The simultaneous cutting of more than two rows of dies can be achieved by constructing a blade support frame with two end longitudinal members and two or more intermediate or central longitudinal members which are connected at their ends by side members. The number of longitudinal members would equal the number of rows of dies plus one. One of the end longitudinal members can carry single-edged short blades for partial cutting. The other end longitudinal member can carry single-edged blades for complete cutting of the extrudates. The intermediate or central longitudinal members may carry long blades on one side and short blades on their other side so that for each row of dies, there is a row of short blades for partial cutting and a row of long blades for complete cutting of the extrudates.

Detailed Description Text (89):
In other embodiments of the present invention, a cutter which rotates in a circular direction may be used to partially cut and completely cut the extrudates from a plurality of die orifices as shown in FIG. 11. The multi-orifice rotating cutter 400 shown in FIG. 11 comprises a multi-orifice extruder 402 which feeds a dough to a plurality of dies 404. The dies 404 are disposed in a circle about a rotating shaft 406. In the embodiment shown in FIG. 11, each of the dies has an orifice 408 in the shape of the side view of an elephant. Short blades 410 for partial cutting of the extrudates and long blades 412 for complete cutting or severing of the extrudates

are mounted upon the rotating shaft 406. The short blades 410 alternate positions with the long blades 412 about the centrally located rotating shaft 406. The die orifices 408 and the cutting edges of each of the blades 410, 412 are preferably equally spaced circumferentially so that the legs on one side of the three-dimensional dough pieces have a thickness which is at least substantially the same as the thickness of the legs on the other side of the dough pieces.

Detailed Description Text (90):
In the embodiment shown in FIG. 11, the number of short blades 410 and the number of long blades 4 12 are each equal to the number of dies 404. However, the number of short blades 410 and the number of long blades 412 may each be less than or greater than 1 per die 404. The greater the ratio of blades per die, the slower the rotational speed of the rotating shaft 406 and the rotating blades 410, 412 need to be for a given mass flow rate and given thickness of the extrudates. Slower rotating speeds are preferred so as to reduce scattering of the three-dimensional dough pieces as they are severed from the remaining dough mass. The ratio of either short blades 410 or long blades 412 per die may, for example, be from 1:1 to 1:10. A preferred ratio of short blades 410 to dies 404 is 1:1 to 3:1 for cracker doughs. Likewise, a preferred ratio of long blades 412 to dies 404 is 1:1 to 3:1 for cracker doughs.

Detailed Description Text (91):
The rotating shaft 406 and the rotating blades 410, 412 which are fixedly attached to the shaft 406 may be driven by a motor different from the motor (not shown) which is used to drive the extruder screws which feed the dough .through orifices 408. An independent drive for the rotating shaft 406 and the attached blades 410, 412 is preferred.

Detailed Description Text (92):
The circular path traveled by the ends of the short blades 410 is shown by the dotted line 414. The circular path traveled by the ends of the long blades 412 is shown by dotted line 416. The short blades 410 travel across only a portion of the orifices 408 to only partially cut the extrudates as they exit the dies 404. The partial cutting by the short blades 410 form two individual legs on one side of the elephant-shaped extrudate without completely severing the extrudate as it continues to exit the die 404. The next or successive blade to pass across the orifice 408 is a long blade 412. The long blade 412 passes across the entire periphery of the orifice 408 to completely cut or sever the elephant-shaped extrudate which was partially cut by the short blade 410. Complete severance of the extrudate by the long blades 412, forms two additional individual legs on the other side of the extrudate to obtain a three-dimensional elephant-shaped piece having four individual legs.

Detailed Description Text (94):
An example of a three-dimensional cracker in the shape of a dog having four individual legs which may be produced in accordance with the present invention is shown in perspective in FIG. 12. The three-dimensional cracker 500 may be produced by baking a leavenable three-dimensional dough piece produced using the apparatus of FIGS. 1-11. The cracker 500, as shown in FIGS. 12 and 13 has two individual, separated front legs 501, 502 and two individual, separated rear legs 503, 504. FIG. 13 is a bottom view of the cracker of FIG. 12 showing the distinct separation of the side legs 501 and 503 from the other side legs 502 and 504. Separation of the side legs 501 and 503 from side legs 502 and 504 is accomplished by the partial cutting of the extrudate as it leaves the die. Separation of the front legs 501 and 502 from the rear legs 503 and 504 is a result of the shape of the die orifice.

Detailed Description Text (98):
Conventional formulations and extruder processing conditions may be used in the production of three-dimensional crackers, cookies, expandable or puffable glassy matrix half-products, pasta, fully expanded or puffed snacks, ready-to-eat cereals, confections such as chewing gum, and pet foods, such as canine or feline biscuits.

Detailed Description Text (99):
The crackers of the present invention may be of the fermented type as well as of the unfermented or chemically leavened type. However, in the production of crackers by

extruding a raw dough and cutting it into three dimensional dough pieces for subsequent baking and leavening it has been found that the high pressures used to extrude the uncooked dough through the dies tends to adversely affect the shaping of the dough pieces and their baking characteristics.

Detailed Description Text (100):
It is believed that the high pressure exerted upon the cracker dough upon extrusion from the dies changes the distribution, size, or shape of air cells in the dough in a manner which may adversely affect the baking characteristics of the dough. In the production of three dimensional crackers from extruded three-dimensional dough pieces it is preferred to control dough viscosity and elasticity to provide high dough shapeability and definition upon extrusion, as well as proper baking characteristics after extrusion. Proper baking characteristics include leavening of the dough while retaining high shape definition, and a tender texture in the final baked good.

Detailed Description Text (101):
The extrudable cracker doughs of the present invention preferably contain an enzyme composition for controlling dough viscosity or consistency for shaping, expansion, and achievement of a tender texture. The enzyme composition comprises proteolytic enzymes, which may be in combination with an amylase. It is believed that the proteolytic enzymes weaken the gluten network which results in a more pliable, extensible dough. This improves extrudability and cultability and aids expansion upon baking of the shaped dough pieces. The proteolytic enzyme also improves tenderness of the baked product. The amylase is believed to partially hydrolyze the starch prior to baking causing a reduced degree of gelatinization of starch which tends to improve the texture of the baked products. In addition, the amylase reduces the viscosity of the dough, which improves extrudability.

Detailed Description Text (105):
The flour which may be used in the present invention includes wheat, corn, rice, barley, rye, oat, potato, tapioca, graham, and mixtures thereof. The preferred flours for making the baked comestibles of the present invention are wheat flours and mixtures thereof with one or more other flour type, such as oat, rice or barley flour.

Detailed Description Text (107):
The extrudable cracker doughs of the present invention preferably contain at least one emulsifier to reduce cracker hardness and improve texture. Exemplary emulsifiers which may be used are sodium stearyl lactylate, lecithin, glycerol monostearate and other mono/diglycerides, or mixtures thereof. A preferred emulsifier is sodium stearyl lactylate. Exemplary total amounts of the emulsifier may range from about 0.05% by weight to about 2% by weight, preferably from about 0.1% by weight to about 1.0% by weight, most preferably from about 0.4% by weight to about 0.8% by weight, based upon the total weight of the extrudable cracker dough. The emulsifier promotes cracker tenderness without over expansion.

Detailed Description Text (113):
The extrudable cracker doughs of the present invention may be produced by creaming together the flavoring ingredients such as salt and malt with the sugar, lecithin, emulsifier, shortening or fat, and the majority of the water to obtain a substantially homogeneous mixture. The flour and sifted sodium bicarbonate may then be admixed with the creamed mixture. The ammonium bicarbonate may be dissolved in water and then added to the mixture.

Detailed Description Text (120):
The substantially homogeneous cracker dough may then be added to an extruder or to a calendar press comprising counter-rotating rollers which force the dough through dies for cutting into three-dimensional dough pieces in accordance with the present invention.

Detailed Description Text (121):
The extrusion pressure will depend upon the extruder size, number of dies, and the dough consistency. Exemplary extrusion pressures range from about 20 psig to about 500 psig, preferably less than 250 psig. High extrusion pressures tend to result in

harder textured crackers. Extrusion temperatures may be from about room temperature or about 75.degree. F. to about 125.degree. F., preferably from about 80.degree. F. to about 110.degree. F.

Detailed Description Text (122):
The extruded, essentially uncooked or raw three-dimensional dough pieces produced in accordance with the present invention may then be transported by conventional conveyor belts to a conventional band oven or jet zone oven for baking into three-dimensional crackers. During baking in the oven, the dough pieces leaven and undergo Maillard browning. The use of a jet zone oven is preferred because it tends to elevate or fluidize the cracker doughs during baking and thereby avoids sticking of the four individual legs. It also facilitates expansion of the product without sticking.

Detailed Description Text (123):
In embodiments of the present invention the cracker dough or other doughs may be produced in situ in an extruder or continuous mixer having a cutter means attached thereto. In other embodiments, the dough may be separately produced in a mixing means such as a continuous mixer, extruder, batch mixer, or combinations thereof. The resulting dough may then be transferred from the mixing means to one or more extruders or one or more pairs of counter-rotating rolls or calendar presses equipped with dies for shaping the dough into extrudates which are cut into three-dimensional dough pieces.

Detailed Description Text (126):
Exemplary glassy half product compositions which may be used in the present invention comprise from about 71% to about 80% by weight rice flour, from about 6.5% to about 7.5% by weight sugar, from about 4.5% to about 15% by weight modified starch, from about 1.6% to about 1.8% by weight salt, from about 1.6% to about 1.8% malt, and from about 4.1% to about 4.5% by weight flavoring, based upon the total weight of dry ingredients. These dry materials may be admixed with water to obtain, for example, a moisture content of about 28% to about 33% by weight, based upon the total weight of the dough composition.

Detailed Description Text (131):
The proteolytic enzyme may be derived from papain and may exhibit essentially no amylase activity. The proteolytic activity of the enzyme composition may range from about 365 to 385 Nu/g.

Detailed Description Text (132):
An extrudable cracker dough may be produced by creaming together the vegetable oil, lecithin, sodium stearyl lactylate, a majority of the water, the salt, sucrose, high fructose corn syrup, and mail The ingredients may be mixed for about three minutes to obtain a substantially homogeneous creamed mixture. The wheat flour and sifted sodium bicarbonate may then be admixed with the creamed mixture. The mixing may be continued for an additional 30 seconds. The ammonium bicarbonate and the proteolytic enzyme are separately dissolved in the remaining portion of the water and separately added to the other mixed ingredients. The mixing may be continued for about another seven to eight minutes to obtain a substantially homogeneous extrudable cracker dough.

Detailed Description Text (133):
The resulting cracker dough may be permitted to lay up to about 3 hours and then transferred to an extruder and cutting apparatus as shown in FIGS. 1-8. The extrusion may take place at a pressure of about 80 to about 180 psig and a temperature of about 80.degree. F. to about 105.degree. F.

Detailed Description Text (138):
The cracker dough may be permitted to lay, then extruded, cut, and baked as in Example 1 to obtain three-dimensional crackers as in Example 1.

Detailed Description Text (141):
The dry ingredients for Examples 3 and 4 may be fed to a Mapimpianti extruder modified to have a plurality of elephant shaped dies or die inserts and a rotary cutter as shown in FIG. 11 wherein the ratio of short blades to dies is 1:1 and the

ratio of long blades to dies is 1:1.

Detailed Description Text (142):
The extruder may contain three chambers or sections. In the first chamber, the dry ingredients may be mixed and preconditioned to a moisture content of about 29% by weight, based upon the total weight of the composition. The composition may then be permitted to flow into the second chamber. This section of the extruder may comprise four temperature zones, heated via electrical barrels. The temperature profile for the four zones may be set to 70.degree. C., 95.degree. C., 115.degree. C., and 120.degree. C., respectively. In the second chamber, the preconditioned material is gelatinized and may be conveyed by what is known as a gelatinization screw, or "G" screw. The cooked composition may then be conveyed into the third chamber. As it enters the third chamber, the cooked composition may be cut into pieces by a small rotary blade. The third chamber may be equipped with paddles for pushing the composition through a forming section and out of the plurality of dies. The third chamber may be equipped with a vacuum for controlling the moisture content of the extrudates to a level which facilitates forming and cutting. In Example 3, the composition may be extruded at a rate of about 141 grams/min. and in Example 4 the rate may be about 137 grams/min. The rotary cutter speed may be set in Examples 3 and 4 so as to obtain three dimensional dough pieces having a weight of about 5.0 to about 5.5 grams per 10 pieces. The three-dimensional dough pieces may then be dried and conditioned at a temperature of about 25.degree. C. and at a relative humidity of about 50% until equilibrium is reached.

Detailed Description Paragraph Table (3):
______________________________________ Example 3 Example 4 DRY INGREDIENTS Weight % Weight % ______________________________________ Rice Flour 79.82 71.25 Sucrose 7.25 6.46 Salt 1.82 1.62 Malt 1.82 1.62 Nacho Flavor 4.53 4.05 Modified Starch (Baka-snak) 4.76 15.00 TOTAL 100.00 100.00 ______________________________________

CLAIMS:

1. Apparatus for the production of three-dimensional food products comprising:

a. means for feeding a food composition to a plurality of dies,

b. a plurality of dies for receiving said food composition and shaping it into at least one shape conforming to the orifices of the dies, whereby a shaped extrudate rope is obtained from each die,

c. a plurality of first blades which pass across only a portion of each of the orifices of a plurality of said dies to only partially cut each of a plurality of the shaped extrudate ropes, and

d. a plurality of second blades which pass across the entire orifices of a plurality of said dies to completely cut each of a plurality of the shaped partially cut extrudate ropes to obtain three-dimensional food pieces, said first blades and said second blades being arranged in alternating positions.

3. Apparatus as claimed in claim 1 wherein said means for feeding comprises an extruder.

5. Apparatus as claimed in claim 1 comprising a conveyor means for receiving the three-dimensional food pieces as they are cut from said extrudate ropes.

11. Apparatus as claimed in claim 1 wherein said plurality of dies are disposed in a circle about a rotating shaft, and said plurality of short blades and said plurality of long blades are arranged on said shaft so that each short blade partially cuts the extrudate rope from each die and each long blade completely cuts the extrudate rope from each die.

Generate Collection

L11: Entry 4 of 5 File: JPAB Nov 24, 1988

PUB-NO: JP363287445A
DOCUMENT-IDENTIFIER: JP 63287445 A
TITLE: PRODUCTION OF CANNED SOFT ADZUKI-BEAN JELLY CONTAINING RICE CAKE

PUBN-DATE: November 24, 1988

INVENTOR-INFORMATION:

NAME	COUNTRY
MOCHIZUKI, KEIZO	
MORIYAMA, YOSHIO	

ASSIGNEE-INFORMATION:

NAME	COUNTRY
MEIJI SEIKA KAISHA LTD	

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15-22

APPL-NO: JP62119997
APPL-DATE: May 19, 1987

US-CL-CURRENT: 426/660
INT-CL (IPC): A23G 3/00; A23L 1/10

ABSTRACT:

PURPOSE: To obtain the titled canned soft adzuki-bean jelly having texture and flavor of the jelly and rice cake, by gelatinizing glutinous rice flour, etc., milling, treating the gelatinized flour with β amylase to give rice cake dough, steaming the dough, blending the steamed dough with an aqueous solution of protein, packing the blend into cans, seaming the cans, sterilizing the cans under heating and cooling.

CONSTITUTION: Glutinous rice or glutinous millet flour is gelatinized by an extruder and the gelatinized expanded rice material is ground. 100pts.wt. of the ground flour is mixed with 70∼100pts.wt. water, steamed, uniformly blended with 0.1∼0.3pt.wt. β-amylase and treated at 60∼65°C for 4hr to give raw rice cake dough. Then 100pts.wt. of the rice cake dough is uniformly blended with 100∼200pts.wt. ordinary rice cake dough or millet cake dough and a solution obtained by dissolving 0.5∼5pts.wt. water-soluble thermally coagulating protein such as dried glair or milk albumin in the equivalent of water to give a rice cake dough 1 blended with protein. Further the dough is dispersed into soft adzuki-bean 3, packed into a can 4, the can is seamed, sterilized under heating and cooled to give the aimed canned jelly.

End of Result Set

☐ Generate Collection

L11: Entry 5 of 5 File: DWPI Nov 24, 1988

DERWENT-ACC-NO: 1989-011754
DERWENT-WEEK: 198902

TITLE: Prepn. of canned yokan paste with mochi rice cake - by crushing mochi paste, re-cooking with water and beta-amylase, kneading with more rice cake and adding to sweet yokan paste

PATENT-ASSIGNEE:

ASSIGNEE	CODE
MEIJI SEIKA KAISHA	MEIJ

PRIORITY-DATA: 1987JP-0119997 (May 19, 1987)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 63287445 A	November 24, 1988		004	

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP63287445A	May 19, 1987	1987JP-0119997	

INT-CL (IPC): A23G 3/00; A23L 1/10

ABSTRACTED-PUB-NO: JP63287445A
BASIC-ABSTRACT:

A mochi paste made by cooking mixt. of rice flour and water in a extruder is crushed and cooked again with water and beta-amylase. The prod. is kneaded with pieces of another mochi rice cake and protonic cpds., and it is put into a sweek yokan paste.

USE - By canning the prod., a new sort of sweet of Japanese style with good preservability can be prepd.

CHOSEN-DRAWING: Dwg.0/2

TITLE-TERMS: PREPARATION CAN YOKAN PASTE MOCHI RICE CAKE CRUSH MOCHI PASTE COOK WATER BETA AMYLASE KNEAD MORE RICE CAKE ADD SWEET YOKAN PASTE

DERWENT-CLASS: D13

CPI-CODES: D03-H01H;

SECONDARY-ACC-NO:
CPI Secondary Accession Numbers: C1989-005170

⑲日本国特許庁（ＪＰ）　⑪特許出願公開

⑫公開特許公報（Ａ）　昭63－287445

⑤Int.Cl.⁴	識別記号	庁内整理番号	㊸公開　昭和63年(1988)11月24日
Ａ 23 Ｇ　3/00	１０７	8114－4B	
Ａ 23 Ｌ　1/10	１０２	8114－4B	

審査請求　未請求　発明の数　1　（全4頁）

㊹発明の名称　餅入り水羊羹缶詰の製造方法

㉑特　願　昭62－119997

㉒出　願　昭62(1987)5月19日

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明　細　書

1．発明の名称

餅入り水羊羹缶詰の製造方法

2．特許請求の範囲

(1)　糯米粉及び又は糯きび粉をエクストルーダーα化処理し得られたα化餅膨化物を粉砕し、該α化餅粉砕粉１００重量部に対して水７０～１００重量部を加えて蒸煮し、次いで０．１～０．３重量部のβアミラーゼを添加して均一に混合し６０～６５℃で４時間反応させ、得られたβアミラーゼ処理餅生地１００重量部に対して通常の方法で得られる餅生地及び又はきび餅生地を蒸煮した餅生地１００～２００重量部を加え、更に乾燥卵白や乳アルブミンの如き水溶性で熱凝固性の蛋白を固形量として０．５～５重量部を等重量の水で溶解して加えるか、或いは生卵白４～４０重量部を加えた後、均一に混合して熱凝固性蛋白配合餅生地を得、水羊羹中に該熱凝固性蛋白配合餅生地を加えて散在させた後に缶内に収容し、通常の方法により巻締め、レトルト内での加熱殺菌及び冷却工程にかけることを特徴とする餅入り水羊羹缶詰めの製造方法。

3．発明の詳細な説明

本発明は水羊羹生地中に老化しない餅生地の成形品を散在させたものを缶内に収容し通常の方法で巻締め後、レトルト内で加熱殺菌し冷却して得られる餅入り水羊羹缶詰の製造方法に関するものである。

（従来の技術）

一般的に水羊羹缶詰は、寒天４重量部、砂糖１４０重量部、小豆漉し餡２００重量部を用意し、寒天を水で膨潤させた後、加熱溶解し、砂糖、漉し餡を加えて沸騰させた後に缶内に充填し、巻締めた後、加熱殺菌する製法により製造されている。

この水羊羹に餅生地を入れることが出来れば、水羊羹の口溶けと、餅の歯当りの２つの異なる和菓子の食感及び風味を同時に楽しむことが出来る。

（発明が解決しようとしている問題点）

しかしながら、水羊羹内に餅生地を混在させたものを缶内に収容し、巻締めしてからレトルト内

に収容し、加熱殺菌した場合には、餅生地が水羊羹内に溶解、分散し餅生地の原形をとどめず、水羊羹と餅生地の２つの和菓子の食感と風味とを同時に楽しむことは出来ない問題点がある。

また、レトルト内での加熱殺菌処理をせずに餅生地を水羊羹中に混在させれば餅の原形は留めるものの、数日で硬化してしまい喫食することが困難なものとなる問題点がある。

本発明の目的は、餅生地の溶解、分散或いは、硬化を防止して、水羊羹と餅生地との２つの和菓子の食感と風味とを楽しむことができる餅入り水羊羹缶詰の製造方法を提供することにある。

（問題点を解決するための手段及び作用）

本発明者等は、これ等の欠点を解決すべく鋭意研究の結果、エクストルーダーでα化処理した糯米粉及び又は糯きび粉を蒸煮して餅生地とし、６０～６５℃でβアミラーゼを４時間反応させた後、該βアミラーゼ処理餅生地１００重量部に通常の方法で糯米粉及び又は糯きび粉を蒸煮して得た餅生地１００～２００重量部を加えて均一に混合し、得られた混合餅生地に熱凝固性の水溶性蛋白０．５～５重量部を等倍量の水に溶解した水溶液を均一に混合した熱凝固性蛋白配合餅生地を得、該熱凝固性蛋白配合餅生地を水羊羹中に散在させた後に巻締めし、レトルト内で加熱殺菌処理した場合に、水羊羹中に溶解分散することがなく、餅の原形状を留め得ることを見出した。

即ち、本発明では、水羊羹中に散在させた餅生地が老化し、硬化することを防止するため

（ａ）糯米粉及び又は糯きび粉を予め一軸又は二軸のエクストルーダーにかけてα化処理し、得られたα化餅生地膨化物を粉砕し、このα化餅粉砕物１００重量部に水７０～１００重量部を加えて蒸煮し餅生地を得る。

（ｂ）この餅生地に０．１～０．３重量部のβアミラーゼを添加し６０～６５℃にて４時間反応させる。

（ｃ）得られたβアミラーゼ処理餅生地１００重量部に通常の方法で製造した餅生地１００～２００重量部を加えて混合餅生地を得る。

（ｄ）得られた混合餅生地１００重量部に対して乾燥卵白、大豆蛋白、乳アルブミン等の水溶性で且つ熱凝固性の蛋白を乾燥固形分量として０．５～５重量部、好ましくは１～３重量部を等量の水で溶解した蛋白液又は生卵白４～４０重量部、好ましくは８～２４重量部を混合する。

かくして得た熱凝固性蛋白配合餅生地を水羊羹生地内に適宜の割合で混在させたものを缶内に収容し通常の方法により巻締、加熱殺菌、冷却処理することにより、水羊羹中で餅生地が形がくずれず硬化することのない餅入り水羊羹缶詰が得られる。

（実施例）

更に本発明を実施例により詳細に述べると、本発明ではまず、糯米粉及び又は糯きび餅粉を一軸エクストルーダー又は二軸エクストルーダー内に供給し、１３０～２００℃程度の加熱条件でクッキング処理することによりα化餅膨化物を得、これを　砕してα化餅粉砕粉を得る。

エクストルーダーのクッキング処理温度は、１３０℃以上２００℃以下とするのが好ましく、１３０℃以下ではα化が不充分となると共に穀粉分子の切断が不充分となり、餅生地に混合使用時に老化防止効果が充分に発揮されない。又、２００℃以上では過度の褐変が起り餅生地にした時に着色したものになるので好ましくない。

かくして得たエクストルーダー処理α化餅粉砕粉１００重量部に水７０～１００重量部を加えて蒸煮処理を行う。

この場合加水量は、７０重量部未満では生地が硬く充分蒸煮することが困難であり、又１００重量部を越えると餅生地が軟かすぎるので食感として好ましくない。

この様にして得たエクストルーダー処理穀粉の蒸煮餅生地にβアミラーゼ０．１～０．３重量部を加えて均一して混合し、６０～６５℃で４時間反応させる。

得られたβアミラーゼ処理餅生地１００重量部に対して通常の方法にて糯米粉及び又は糯きび粉

100重量部に対して水70～100重量部を加えて蒸煮する。

この蒸煮した餅生地100～200重量部を混合し老化しない混合餅生地を得る。かくして得た糯米粉及び又は糯きび粉等の混合餅生地100重量部に対して乾燥卵白、大豆蛋白、乳アルブミン等の水溶性で熱凝固性蛋白の固形分換算てせ0.5～5重量部、好ましくは1～3重量部を等量の水に溶解して加え、又は生卵白4～40重量部、好ましくは8～24重量部を加えて均一に混合する。

上記した蛋白液量は、1重量部未満の時にはレトルト内で加熱殺菌中に餅生地の分散溶解が起り好ましくない。又この蛋白液量が10重量部を越えると蛋白の味が餅生地の風味を落す故に好ましくない。

又上記、混合餅生地100重量部に対して蛋白液2～6重量部を配合するのが更に好ましいのである。

かくして得た蛋白液を添加配合した餅生地を通常の方法で得た水羊羹生地中に適宜量で球形、四角柱形等の任意形状に成形してから加えて通常のレトルト内加熱殺菌の条件即ち115℃～118℃で15～30分間加熱処理し、次いで冷却して缶詰め製品を得る。

水羊羹生地の糖度が35度～70度であっても本発明の餅生地は何等変形せず、水羊羹生地中に混入した時と同じ形を保ったままで充分な加熱殺菌をうける。

第1図及び第2図は本発明による蛋白液配合の餅生地1と従来の方法で製造した餅生地2とを糖度38度の水羊羹生地中3に入れて缶4内に缶詰し、118℃で30分間レトルト内で加熱殺菌処理した時の状態を示すものであり、通常の方法で製造した餅生地2はレトルト内加熱殺菌処理によって第2図に示すように全く原形を留めないが、本発明により餅生地1は第1図に示すように全く変化せず原形を留めていることがわかる。以下、本発明を製造例について更に詳細に説明する。

製造例1

寒天4重量部に水80重量部を加えて膨潤させ、充分膨潤したら更に水260重量部を加えて加熱し溶解する。充分溶解した所で砂糖140重量部、小豆練し餡200重量部を加えて加熱溶解し、糖度38度に調整した水羊羹生地を得る。

一軸エクストルーダーで150℃でα化した糯米粉50重量部に水50部を加えて横型回転蒸煮機で蒸煮し、エクストルーダー処理餅生地を得る。

該餅生地にβアミラーゼ0.2重量部を加えて65℃で4時間反応させる。得られたβアミラーゼ処理餅生地50重量部に対して糯米粉50重量部に水50重量部を加えて横型回転蒸煮機でα化して得た餅生地50重量部を加えて均一に混合し、該混合餅生地に乾燥卵白3重量部に水3重量部を加えて溶解し、均一に混合させせる。

得られた卵白配合餅生地を任意の形に成形し、先に製した水羊羹生地中に混在させた後の缶内に収容し、通常方法で巻締めしレトルト内に収容し、120℃で30分間加熱殺菌処理し、冷却して得た餅入り水羊羹缶詰は餅の形状及びテクスチャーを失っておらず、嗜好性のすぐれた製品であった。

製造例2

製造例1に記載の方法において糯きび粉を使用してエストルーダー処理・βアミラーゼ処理を行って得たβアミラーゼ処理きび餅生地50重量部に実施例1に記載の方法で製したきび餅生地50重量部を混合し、更に生卵白10重量部を混合して得た卵白配合きび餅生地を四角形に成形して、水羊羹生地中に混在させ、缶内に収容し、通常の方法で巻締めし、レトルト内にて収容し、120℃で25分間加熱殺菌処理し、次いで冷却してきび餅生地入り水羊羹缶詰を得た。

該卵白配合きび餅入り水羊羹は、きび餅の風味及びテクスチャーを失っておらず、嗜好性のすぐれた製品であった。

(発明の効果)

以上説明したように本発明では、餅生地中に水溶性蛋白を分散させた熱凝固性蛋白配合餅生地を用いたので、該餅生地を水羊羹と共にレトルト内で加熱殺菌処理しても、餅生地中に分散している

水溶性蛋白の熱凝固により流動性の増加を阻止して該餅生地が原形を留めて得られるようになり、従って水羊羹と餅との2つの異なる和菓子の食感と風味を同時に楽しむことができ、餅入り水羊羹を容 に製造することができる。

4．図面の簡単な説明

第1図は本発明による餅生地の方法により製造した餅生地を加熱殺菌した時の餅入り水羊羹の状態を示す縦断面図、第2図は従来の方法により製造した餅生地を加熱殺菌した時の餅入り水羊羹の状態を示す縦断面図である。

1…蛋白配合の餅生地、3…水羊羹、4…缶。

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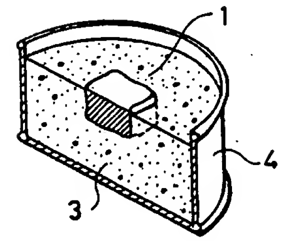
第1図



第2図